

**The Sun :-** Nearest star to the Earth.

Composition by mass:-

74% Hydrogen

24% Helium

2% heavier element

Surface temperature :-  $5500^{\circ}\text{C}$

Mass :-  $2 \times 10^{30}$  Kg

Mean density :-  $1400\text{kg/m}^3$

Solar constant :-  $1370\text{ W/ m}^2$

Luminosity :-  $3.8 \times 10^{26}\text{ W}$

Gravitational acceleration :-  $273\text{ m/s}^2$  (  $27.9\text{ g}$ )

The source of sun's energy is nuclear fusion reaction.

**Structure :-** The sun has 6 regions.

1. The core
2. The radiative zone
3. The convective zone
- 4 Photosphere (Visible surface)
5. Chromosphere
6. Corona

At the core the temp. is about 15 million  $^{\circ}\text{C}$ .

Nuclear fusion reaction takes place at the core

The surface of the sun , the photosphere is a 500 km thick region from which most of the Sun's radiations escape outward.

Above the photosphere lie the chromosphere & the corona, which makes the thin solar atmosphere.

This is where we see features such as Sunspot & solar flares.

The temp. in the sun's atmosphere increases with altitude, reaching as high as 2 million  $^{\circ}\text{C}$ .

**The Stars :-** Stars are huge celestial bodies made mostly of hydrogen & helium that produce light & heat from nuclear reaction inside their core.

Stars are usually birthed in hydrogen based dust clouds called nebulae.

Stars are classified by their spectra & their temp. There are 7 main types of stars.

In order of decreasing temp. **O, B, A, F, G, K & M.**

This is known as Morgan - Keenan (MK) system.

**Luminosity:-** The total amount of energy at all wavelength that it emits per second.

Luminosity of the sun is given by  $L_{\text{sun}}$  or  $L$ .

Luminosity of other stars are expressed in terms of  $L_{\text{sun}}$ .

Luminosity is proportional to  $R^2 T^4$

$R$ - radius of star.

$T$ - Absolute temp.

**Apparent Brightness:-** The amount of star's energy that reaches a given area(unit area) each second here on earth is called its apparent brightness

**Galaxy :-** An enormous cluster of billions of stars held together by gravitational forces is called galaxy.

It contains stars (96%), gases ( 3%) & dust.

There are about  $10^{11}$  galaxies.

Hubble ( An american astronomer ) divided galaxies into three categories.

1. Spiral - Milkyway, Andromeda.
2. Elliptical :- Messier 87
3. Irregular :- Small magellanic.

**Milkyway galaxy :-**

Indian name - Akash ganga

our solar system is the part of it.

shape:- Barred spiral

Mass :-  $3 \times 10^{41} \text{Kg}$ .

**Constellation** :- A group of stars which are arranged in a pattern resembling some recognizable figure is called a constellation.

There are 88 known constellation.

Orion, ursa major, ursa minor, Cassiopeia are few constellation.

Pole star is the part of ursa minor.

**Planets** :- The celestial bodies which revolve around the sun.

The most recent definition of a planet was adopted by the International Astronomical Union in 2006. It says a planet must do three things:

1. It must orbit a star (the Sun).
2. It must be big enough to have enough gravity to force it into a spherical shape.
3. It must be big enough that its gravity cleared away any other objects of a similar size near its orbit around the Sun.

**There are 8 planets in our solar system.**

In increasing order of their distance from the sun, The planets are :- Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus & Neptune.

we can divide planets into 2 categories

(i) Terrestrial Planets :- They have rocky & solid surface.

Mercury, Venus, Earth & Mars.

(ii) Jovian planets :- Made up of gases.

Jupiter, Saturn, Uranus & Neptune.

## **1. Mercury**

Smallest planet

nearest planet from sun

It has zero moon.

2nd hottest planet.

known as morning or evening star.

It takes only 88 days to go once around the sun.

named after Roman messenger of gods

Indian name :- Budh

## **2. Venus :-**

Hottest planet (because of CO<sub>2</sub> in its atmosphere)

Second brightest object after moon in night sky.

Earth's sister planets.

No moons or rings

known as morning & evening star.

A day on venus lasts longer than a year

Named after Roman goddess of love

## **3. The Earth (Prithvi):-**

Largest terrestrial planet.

Most dense planet.

It completes one revolution around the sun in 365 1/4 days.

Known as blue planets (70% part cover with water.)

It has strong magnetic field.

It has only one natural satellite.

## **4 Mars (Mangal) :-**

Named after Roman god of War.

Second smallest planet.

Red planet.

It has two moons

Phobos & Deimos.

## **5 Jupiter (Brihaspati):-**

Largest planet

have largest no. of moons (63)

Its moon Genymede is the largest moon of the solar system.

made up of gases, known as gas giant.

## **6. Saturn ( Shani)**

Second largest planet

There are three distinct rings surrounding this planet.

34 natural satellites (moons)

Titan is the largest moon of it.

Names after Roman god of saturnus.

It is flattest planet.

## **7. Uranus ( Arun)**

First planet discovered with use of telescope.

Known as ice giant.

Coollest planet (-224°C)

It has 27 satellite (moons)

Titania is the largest planet of it.

## **8. Neptune (Varun):-**

Farthest planet from sun

Named after Roman god of Sea.

it has very active climate.

It has 14 moons

Triton is the largest planet.

## **Motion of The Earth:-**

The earth has two types of motion.

- (a) Rotation on its axis
- (b) Revolution around the sun.

It completes one rotation on its axis in 24 hr. which we called One Day.

The axis of earth is tilted at an angle of  $23.5^\circ$  to the perpendicular plane.

The rotation of the earth on its axis causes day & night.

The motion of tilted earth around the sun causes seasons.

The four seasons are summer, winter, spring & autumn.

The season after winter & before summer is called spring.

The season after summer & before winter is called autumn.

We can divide the earth into two half sphere called two hemisphere.

- (a) Northern hemisphere N.H.
- (b) Southern hemisphere S.H.

India is the part of northern hemisphere.

21 June :- Longest day in NH & Shortest day in SH

22 December :- Shortest day in NH & Longest day in SH

21 March & 23 September :- The duration of day & night is equal in both hemisphere.

**Satellite** :- It is heavenly body that revolves around a planet.

Natural satellite

Artificial satellite.

**The Moon** :- Earth's only natural satellite.

It takes same time (27 days & 7 hours) to revolve around the earth as well as to rotate once about its own axis.

The same side of moon always facing the earth.

There is no atmosphere at moon.

**Phases of moon** :- The different views of moon (as seen from the earth) are called phases of moon.

This occurs because of relative motion of the earth , sun & moon.

New moon (Amavasya) - moon appears to be in darkness.

Waxing phase (increasing phase of moon)

Full moon (Purnima) :- Moon appears as full round disc.

Wanning phase (decreasing phase of moon.)

**Solar eclipse** :- It is a natural event that takes place on earth when the moon moves in its orbit between earth & the sun. (also known as an occultation)

It happens at new moon.

The lunar orbit is elliptical & tilted with respect to earth's orbit, so we can only see upto 5 eclipses per year.

The longest total solar eclipse can last is 7.5 minutes.

Almost identical eclipses occur after 18 year & 11 days, this period is called saros.

**Lunar eclipse** :- It occurs when the moon passes directly behind the earth into its umbra ( shadow). This can occur only when the sun, earth & moon are aligned exactly.

It occurs in full moon night.

**Asteroid**:- These are small, rocky solar system bodies that populate interplanetary space out to the orbit of jupiter.

Asteroid comes in three composition classes.

1. C type (chondrite) :- made of clay & silicate rocks.
2. S type (stony) :- made of silicate rock & nickle iron mixture.
3. M type :- metallic nickel iron.

Most asteroids orbit the sun in the asteroid belt which lies between mars & jupiter.

These are also referred to as minor planets or planetoids.

Best known asteroids are

A. ceres            B. pallas            C. vesta

**Comets** :- A comet is a very small solar system body made mostly of ices mixed with smaller amount of dust & rock.

The main body of comet is known as nucleus & it can contain water, CH<sub>4</sub>, N<sub>2</sub> & other ices.

The closest point in a comet's orbit to the sun is called Perihelion & the most distance point is called Aphelion.

Comets have two tails

A dust tail & a plasma tail.

comet's orbits are usually elliptical.

comets are categories as periodic & non periodic.

Halley's comet is a periodic comet , which returns to the solar system in every 76 years.( last seen in 1986).